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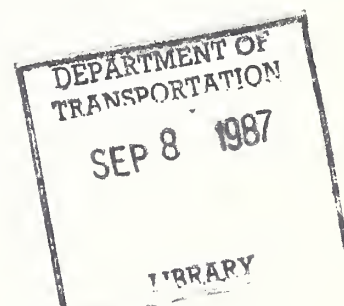


U.S. Department of
Transportation

Office of the Secretary
of Transportation

The Effects of Safety Seat Legislation on Pediatric Trauma: **EXECUTIVE SUMMARY**

University Research
Program



Executive Summary
Under Contract
DTRS-5683-C-00027

DOT/OST/P-34/86/045
February 1986

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16. Abstract This study was designed to study the impact of a child passenger safety law on pediatric motor vehicle trauma, as seen from the perspective of a hospital emergency room setting. The data was obtained from an ongoing monitoring system in hospital emergency rooms and the Coroner's Office. All children under the age of 15 years evaluated in the monitored emergency rooms after involvement in a motor vehicle incident were included. 1981-1982 constituted the pre-legislative years; 1983-1984 were the post-legislative years. Those children greater than 4 years, not covered by the legislation were the control population. The major findings for children less than 4 years (covered by the law) were: 1) Restraint use increased from 26% pre-legislation to 50% in the post-legislation period among the hospital based sample. This was a significant increase. 2) A significant increase in those medically determined to be uninjured was documented. 3) Among those injured there was no significant change in the severe and critical injuries. 4) Head injuries decreased by 16%. 5) Hospital emergency room utilization did not decrease, however. 6) There was a significant decrease in the number of noncrash injured children in the post legislation period, 17% to 7%.			
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol When You Know Multiply by To Find Symbol

LENGTH

in	inches	2.5	cm
ft	feet	30	m
yd	yards	0.9	m
mi	miles	1.6	km

AREA

in ²	square inches	6.5	cm ²
ft ²	square feet	0.09	m ²
yd ²	square yards	0.8	m ²
mi ²	square miles	2.6	km ²
	acres	0.4	ha

MASS (weight)

oz	ounces	28	g
lb	pounds	0.45	kg
	short tons (2000 lb)	0.9	t

VOLUME

teaspoon	teaspoons	5	ml
Tablespoon	tablespoons	15	ml
fl oz	fluid ounces	30	ml
c	cups	0.24	l
pt	pints	0.47	l
qt	quarts	0.95	l
gal	gallons	3.8	l
ft ³	cubic feet	0.03	m ³
yd ³	cubic yards	0.76	m ³

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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Approximate Conversions from Metric Measures

When You Know Multiply by To Find Symbol

LENGTH

mm	millimeters	0.04	in
cm	centimeters	0.4	in
m	meters	3.3	ft
km	kilometers	1.1	mi
		0.5	mi

AREA

cm ²	square centimeters	0.16	square inches
m ²	square meters	1.2	square yards
km ²	square kilometers	0.4	square miles
ha	hectares (10,000 m ²)	2.5	acres

MASS (weight)

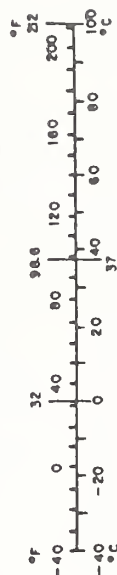
g	grams	0.075	ounces
kg	kilograms	2.2	pounds
t	tonnes (1000 kg)	1.1	short tons

VOLUME

ml	milliliters	0.03	fluid ounces
l	liters	2.1	pints
l	liters	1.06	quarts
l	liters	0.26	gallons
m ³	cubic meters	35	cubic feet
m ³	cubic meters	1.3	cubic yards

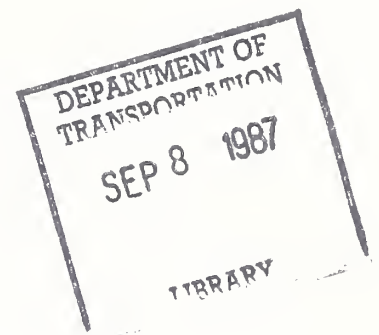
TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
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*1 in = 2.54 in exactly. For other exact conversions and more detailed tables, see NBS Misc. Publ. 285, Units of Weights and Measures, Price \$2.25, SO Catalog No. C13.10-285.

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THE EFFECTS OF SAFETY SEAT LEGISLATION
ON PEDIATRIC TRAUMA,

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2 Debora E. Dunkle, Ph.D.
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February, 1986

Public Policy Research Organization
University of California, Irvine

EXECUTIVE SUMMARY

A number of studies have found that mandatory child passenger safety laws, when enforced, are effective in reducing the overall number of injuries and fatalities for the legislated population (Hall and Daniel, 1983; Decker et al., 1984; Montague, 1984; Wagenaar and Webster, 1985; Guerin and MacKinnon, 1985). However, the effects of mandatory restraint use legislation on injury patterns and severity of injury or on the health care delivery system in terms of utilization rates have not been addressed. This study was designed to examine the effects of a mandatory restraint use law on trauma patterns and severity of injury of pediatric motor vehicle accident victims who were evaluated and treated in hospital emergency rooms in Orange County, California. The impact of the California Child Passenger Safety Act was analyzed in terms of 1) changes in injury patterns and injury severity measures; 2) changes in frequency and severity of head injuries, (the most common anatomic area of injury for children); 3) changes in the number of noncrash injured children; and 4) changes in utilization of emergency rooms by young children. Descriptive analyses of the mechanisms of injury and trauma patterns of restrained under four year olds who were injured were also done.

The data source used in this study was taken from an ongoing monitoring system established in 9 hospital emergency room facilities as well as the Coroner's Office in Orange County, California. The monitoring system was established in 1980 and has continued uninterrupted since that time. The data used in the analysis consists of all children through the age of 14 years who were involved in motor vehicle accidents and were subsequently evaluated in the monitored emergency rooms during the period 1981-1984. Case data has been combined for the two years prior to enactment of the California Child Passenger Safety Law (1981-1982) and for the two years following enactment of the law (1983-1984). A total of 1,757 children up through 14 years of age are included in the sample; 583 were less than 4 years of age.

The major findings from this study are summarized. It should be re-emphasized that the conclusions noted below focus solely on children evaluated in a hospital emergency room setting. All children were passengers involved in motor vehicle accidents and were presumed to be injured in the accident.

Restraint use significantly increased in the sample of under four year olds in the hospital monitoring system following enactment of the law. In the context of the emergency room setting, a major change in restraint use among children less than 4 years coming for evaluation of injuries secondary to involvement in a motor vehicle crash was observed. The percent of restrained under four year olds significantly increased from 26% in the two years before the law to 50% in the two year period following enactment of the law.

A significantly higher proportion of under four year olds were medically determined to be uninjured after enactment of the mandatory restraint legislation. The percent of uninjured under 4 year olds significantly increased from a pre-legislation baseline of 30% to 42% uninjured in the

post-law period. While the phenomenon of the uninjured young child coming to an emergency room for evaluation following a motor vehicle crash was apparent even in the pre-legislation period, the analysis indicated that restraint use rather than a rise in parental concern was a cause of the increase in uninjured in the post-legislative period.

While there was an increase in uninjured under four year olds evaluated in hospital emergency rooms, no significant change was seen in the frequency of those sustaining serious or critical injuries. The majority of injuries among children in both the pre- and post-legislation periods were in the minor and moderate injury severity categories. Few serious injuries were observed in the under four year olds in either the pre- or post-legislation period of time. The increase in restraint use appears to have had its major effect in shifting injuries from the minor and moderate severity categories to the category of 'no injury'. There appeared to be little effect on the reduction of the more serious injuries.

In the two years following implementation of the child passenger safety law, a significant reduction in the number of head injuries was documented in the children less than 4 years of age. The analysis indicated that there was a 16% reduction in the number of under four year olds who sustained head injuries in the post-legislation period. There was no change in the number of head injuries among those not covered by the law.

While head injuries decreased for the under four year olds in the post-legislation period, there was no accompanying increase in injuries to other body areas. Although there was a reduction in head injuries in the post-legislation period, this reduction was not associated with an increase in injuries to other body areas in the post-legislation period. The major change in trauma patterns for the under four year olds in the post-law period was from head injury to no injury rather than from head injury to injury to another body area.

Utilization rates of hospital emergency rooms for under four year olds involved in motor vehicle crashes did not decrease significantly after enactment of the law. For the young child it appears to be the norm for the parent/guardian to bring the child in to the emergency room to be checked following involvement in a motor vehicle accident, even in the absence of a visible injury. Children in this age cohort are less verbal regarding their injuries and parents are more likely to take a conservative approach and have the child medically examined. Restraint use does not appear to have altered this behavior. This finding indicates that mandatory restraint use legislation is unlikely to dramatically reduce emergency room use among very young children involved in motor vehicle crashes.

Utilization rates of hospital emergency rooms for under four year olds involved in motor vehicle noncrashes, however, did decrease significantly after enactment of the law. In a noncrash accident, the child is injured as a result of sudden stops, swerves, loss of balance or falling out of the vehicle in the absence of vehicle impact with another vehicle or object. Unrestrained under 4 year olds are particularly prone to noncrash accidents because they can easily lose their balance in the vehicle or, because of their level of cognitive development, they may be more likely to open a door

in a moving vehicle or lean against an improperly latched vehicle door. A dramatic decrease in noncrash cases was seen in the post-law period. While 17% of under four year olds involved in motor vehicle accidents and evaluated in the emergency rooms had been involved in noncrash accidents in the pre-law period, in the two years after the enactment of the law, only 7% were involved in noncrash accidents. With increased restraint use as a result of legislation, the expectation is the eventual near elimination of noncrash injuries.

Based on the analyses performed in this study we also conclude that injury reduction in motor vehicle crashes can be maximized by increased proper use of age appropriate restraints. However, the currently available restraint use technology, even in the face of 100% use, will not totally eliminate injuries in motor vehicle crashes. As has been documented in this study, trauma can occur even in the face of proper restraint use. A certain degree of mobility is allowed even with proper use of the CSS. This is particularly noted with respect to the head of the child which can hit against the side of the restraint itself. Seat belts also allow some lateral movement of the body and, in the case of lap only belts, jackknifing over the belt. Such movement can cause head injuries if there is impact with the vehicle interior or abdominal injuries from loading against the belt. In the case of severe crashes, injuries can occur which are unavoidable and unrelated to the use of a restraint, e.g., intrusion into the passenger compartment from lateral impacts or rollovers, flying glass. Additional technologies in the areas of restraint systems and vehicle designs will have to be instituted in order to reduce further death and injury.

REQUEST FOR FEEDBACK TO The DOT Program Of University Research

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Report Title:

The Effects of Safety Seat
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